A Spot Welding Reliability Problem

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Many production lines have a station where spot welding takes place. At such stations it is frequently the case that multiple operators draw on the same power supply. Given the high voltage drops that occur during spot welding and the deterioration in weld quality that can occur when a large number of operators spot weld simultaneously, it is of interest to investigate the probability of poor welds being produced. We analyse a spot welding station used at General Motors-Holden (Aust). The first model reduces to a generalized Engset system (as used in telecommunications models). The second model removes access to the power supply of additional welders whenever the extra power drain would cause poor quality welds. We make the assumption that all relevant distributions are negative exponential so as to allow analytic tractability of the problem. The model then becomes one of the Quasi Birth and Death type as analysed by Neuts (1981) and Gaver et al. (1984). Performance measures and numerical results are presented for the range of parameter values typical of those at GMH. These show the size of power supply required to adequately service a spot welding station is very small for either model. Hence it is preferable to implement the second model examined as this would lead to no poor quality welds being produced.

References

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Inspection Policies for Deteriorating Units with Symptomatic Emissions

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This paper considers the problem of when to inspect a unit which can deteriorate and fail to operate satisfactorily. Most previous work in this area assumes either that any change in the state of the unit is immediately noticed (continuous inspection) or that on inspection the state of the unit is known exactly. The models in this paper consider the case where on inspection the state of the unit is not known but the values of related phenomena, like ill pressure or vibration are obtained. From the changes in these readings the decision has to be made whether the unit is in a satisfactory state or whether it is necessary to repair or replace it.

One class of the models looks at the case of stand-by units where the unit is only in operation in emergencies and the inspections are trying to ascertain whether the